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10/677,578	10/02/2003	David L. Churchill	115-007	9298
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JAMES MARC LEAS 37 BUTLER DRIVE S. BURLINGTON, VT 05403			EXAMINER WHITTINGTON, KENNETH	
			ART UNIT	PAPER NUMBER
			2862	

DATE MAILED: 01/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b> 10/677,578	<b>Applicant(s)</b> CHURCHILL ET AL.	
	<b>Examiner</b> Kenneth J Whittington	<b>Art Unit</b> 2862	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 October 2003 and 11 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. ____.  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date ____.   | 6) <input type="checkbox"/> Other: ____.                                    |

## DETAILED ACTION

### *Information Disclosure Statement*

The listing and/or citation of references in the specification is not a proper information disclosure statement.

5 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner  
10 on form PTO-892, they have not been considered.

### *Drawings*

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in  
15 the claims. Therefore, the core having a first and second portion of different diameters as recited in claim 8, the second bearing including the coil as recited in claim 31 and a sleeve within said coil as recited in claim 32 must be shown or the feature(s) canceled from the claim(s). No new matter should be  
20 entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should

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include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the  
5 appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of  
10 the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required  
15 corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

The disclosure is objected to because of the following  
20 informalities: on page 5, line 15, "I" should be "IT".  
Appropriate correction is required.

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***Claim Objections***

Claim 8 is objected to because of the following informalities: "said captured core" lacks antecedent basis. Changing this term to "said captive core" would overcome this  
5 objection. Appropriate correction is required.

Claim 10 is objected to for containing inconsistent language. Lines 1-2 recite the second bearing "mounted to said coil or to said housing" and line 3 recites that the core slides  
10 "within a second hole in said second bearing". If the second bearing is mounted to the coil, it cannot slide within it. Perhaps breaking the claim limitations into two claims would obviate this objection. Appropriate correction is required.

15 Claim 25 is objected to because the term "said spring" lacks antecedent basis. Perhaps this claim should depend from claim 19. Appropriate correction is required.

20 Claim 26 is objected to because the term "said core stop" lacks antecedent basis. Perhaps this claims should depend from claim 25, not claim 1. Appropriate correction is required.

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***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

5       A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10       Claims 28, 30-32 and 34 rejected under 35 U.S.C. 102(b) as being anticipated by Roeger (US 3,221,281). Regarding claim 28, Roeger discloses a transducer cartridge comprising: a housing having an inner surface having a housing-inside dimension, said housing for holding a displacement sensor and a guidance  
15       mechanism (See Roeger FIG. 1, item 12), said displacement sensor including a coil and a captive core, said captive core having a core-outside dimension (See FIG. 1, items 46, 48, 50 and 51), wherein said guidance mechanism comprises a first bearing and a second bearing for guiding said core (See FIG. 1, items 34 and  
20       38, also note item 20 where it contacts the magnetic core 46 is interpreted as a bearing), wherein said first bearing is connected to said housing (See FIG. 1), wherein said first bearing has an axial hole having an axial-hole dimension about equal to said core-outside dimension, wherein said core slidably  
25       extends through said axial hole (See FIG. 1), wherein said

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second bearing has a second-bearing-outside dimension about equal to said housing-inside dimension, wherein said guidance mechanism is for resisting lateral movement and lateral rotation of said core while allowing axial movement of said core into and  
5 out of said coil (See FIG. 1).

Regarding claim 30, Roeger discloses the second bearing being connected to the housing (See FIG. 1, items 12, 34 and 38).

Regarding claim 31, Roeger discloses the second bearing  
10 including the coil (note comment above that item 20 of FIG. 1 where it contacts the magnetic core 46 can be interpreted as being a bearing and also containing the coils).

Regarding claim 32, Roeger discloses a sleeve within said coil (See FIG. 1, note portion of 20 is sleeve between the coil  
15 and the core).

Regarding claim 34, Roeger discloses a spring for spring loading said core (See FIG. 1, item 72).

Claims 28 and 29 are rejected under 35 U.S.C. 102(b) as  
20 being anticipated by Inaba et al. (JP 63241401). Regarding claim 28, Inaba et al. discloses a displacement sensor comprising: a housing having an inner surface having a housing-inside dimension, said housing for holding a displacement sensor

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and a guidance mechanism (See Inaba et al. FIG. 3, item 58),  
said displacement sensor including a coil and a captive core,  
said captive core having a core-outside dimension (See FIG. 3,  
items 12, 13, 17 and 21), wherein said guidance mechanism  
5 comprises a first bearing and a second bearing for guiding said  
core (See FIG. 3, items 57 and 56), wherein said first bearing  
is connected to said housing (See FIG. 3), wherein said first  
bearing has an axial hole having an axial-hole dimension about  
equal to said core-outside dimension, wherein said core slidably  
10 extends through said axial hole (See FIG. 3), wherein said  
second bearing has a second-bearing-outside dimension about  
equal to said housing-inside dimension, wherein said guidance  
mechanism is for resisting lateral movement and lateral rotation  
of said core while allowing axial movement of said core into and  
15 out of said coil (See FIG. 3).

Regarding claim 29, Inaba et al. discloses the second  
bearing connected to the captive core.

***Claim Rejections - 35 USC § 103***

20 The following is a quotation of 35 U.S.C. 103(a) which  
forms the basis for all obviousness rejections set forth in this  
Office action:



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5 (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere*

10 Co., 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and  
15 the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the  
20 application indicating obviousness or nonobviousness.

Claims 1-10, 15, 18-21, 23, and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roeger. Regarding claims 1-6, Roeger teaches a transducer cartridge comprising a housing holding a sensor (See Roeger FIG. 1), said sensor  
25 including a coil and a captive core (See FIG. 1, items 28, 30, 32, 46, 48, 50 and 51), wherein an electrical measurement of said coil provides information about displacement or velocity of said captive core (See col. 1, lines 10-34), further wherein said coil has an axis extending in a first direction (See FIG.  
30 1).

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However, Roeger does not explicitly teach the dimensions of the device as recited in claims 1-6. Nonetheless, modifying Roeger to have the relative dimensions as recited in the claims would be obvious to one having ordinary skill in the art through  
5 routine experimentation because where the where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device is not patentably  
10 distinct from the prior art device. *See Gardner v. TEC Systems, Inc.*, 220 USPQ 777 (Fed. Cir. 1984), *cert. denied*, 225 USPQ 232 (1984). One having ordinary skill would further be motivated to do in view of Roeger, which recognized a need for a small sized transducer (See col. 1, lines 25-30).

15       Regarding claim 7, Roeger teaches the captive core extending into said coil (see FIG. 1).

      Regarding claim 8, Roeger teaches the captive core having a first portion having a first diameter (See FIG. 1, item 46), wherein said captive core further includes a second portion  
20 having a diameter greater than said first diameter for retaining said core within said housing (See FIG. 1, items 48 and 50), and wherein said captured core is supported in said housing by a

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first bearing and by a second bearing (See FIG. 1, items 34 and 38, one slide bearing on each side of the core).

Regarding claim 9, Roeger teaches the first bearing being connected to said housing, wherein the core slides within a hole  
5 in said first bearing (See FIG. 1).

Regarding claim 10, Roeger teaches second bearing is mechanically mounted to said housing (See items 12, 34 and 38), wherein said core slides within a first hole in said first bearing and within a second hole in said second bearing (See  
10 FIG. 1), wherein said core extends out from said housing from said first bearing (See FIG. 1, note ball 64 on end of core extends from the housing), wherein said second bearing is spaced a distance from said first bearing to provide resistance to lateral forces on said core where it extends from said housing  
15 while allowing free axial movement of said core (See FIG. 1, items 34 and 38).

Regarding claim 15, Roeger teaches the sensor being an induction sensor or eddy current sensor (See col. 1, lines 10-12).

20 Regarding claim 18, Roeger teaches the sensor being a three coil device (See FIG. 1).

Regarding claim 19, Roeger teaches a spring to provide a return force to said core (See FIG. 1, item 72).

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Regarding claim 20, Roeger teaches the core extending through said spring and into said coil (See FIG. 1).

Regarding claim 21, Roeger teaches the core including a ferromagnetic material (See col. 1, lines 53-57).

5        Regarding claim 23, Roeger teaches the core further comprising a contact point for making contact with an object to be measured, wherein said contact point is made of a hard material that resists wear (See FIG. 1, item 64).

10       Regarding claim 25, Roeger teaches a core stop to capture said core within said housing, wherein said core stop further limits extension of said spring (See FIG. 1, core stop item 68 and also note sleeves 38 can be core stops that interact with steps in core parts 48 and 50).

15       Regarding claim 26, Roeger teaches the core stops sized to have a diameter equal to inside of housing and provides a guiding function for the core (See FIG. 1, note bearings 34 and 38 with core stops as noted above interacting with core portions 48 and 50 are core stops and have guide functions).

20       Regarding claim 27, Roeger teaches lead wires electrically connected to said coil and extending to a circuit (See FIG. 1, item 16).

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Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiramatsu et al. (US 6,710,592). Regarding claims 1-6, Hiramatsu et al. teaches a transducer cartridge comprising a housing holding a sensor (See Hiramatsu et al. FIG. 22A), said sensor including a coil and a captive core (See FIG. 1, items 30, 31, 51 and 52), wherein an electrical measurement of said coil provides information about displacement or velocity of said captive core (See col. 1, lines 7-13), further wherein said coil has an axis extending in a first direction (See FIG. 22A).

However, Hiramatsu et al. does not explicitly teach the dimensions of the device as recited in claims 1-6. Nonetheless, modifying Hiramatsu et al. to have the relative dimensions as recited in the claims would be obvious to one having ordinary skill in the art through routine experimentation because where the where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device is not patentably distinct from the prior art device. See *Gardner v. TEC Systems, Inc.*, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 225 USPQ 232 (1984).

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Regarding claim 7, Hiramatsu et al. teaches the captive core extending into said coil (see Hiramatsu et al. FIG. 22A).

Claims 8 and 11 are rejected under 35 U.S.C. 103(a) as  
5 being unpatentable over Hiramatsu et al. as applied to claim 1 above, and further in view of Chass (US 6,356,072). Hiramatsu et al. teaches the limitations of claim 1 and regarding claim 8, Hiramatsu et al. teaches the captive core having a first portion having a first diameter (See FIG. 22B, item 52), wherein said  
10 captive core further includes a second portion having a diameter greater than said first diameter for retaining said core within said housing (See FIG. 22A, item 51), and wherein said captured core is supported in said housing by a first bearing (See FIG. 20, linear bush 4 and balls). However, Hiramatsu et al. does  
15 not explicitly teach a second bearing. Chass teaches a second bearing for use in a linear transducer (See Chass FIGS. 22-27, note item 24). It would have been obvious to use the second bearing of Chass in Hiramatsu et al. One having ordinary skill in the art would have been motivated to keep the core assembly  
20 centered in the coil as suggested by Chass (See Chass col. 4, lines 35-48).

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Regarding claim 11, this combination teaches the second bearing integral with the second portion and moving with the core (See Chass FIGS. 22-27).

5        Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hiramatsu et al. in view of Chass, and further in view of Jones et al. (US 2002/0153982). The combination of Hiramatsu et al. in view of Chass teaches the limitations of claims 1, 8 and 11 as noted above. However, they do not teach  
10 of the particular material for the bearings. Jones teaches using artificial ruby or sapphire bearings in a linear actuator (See Jones et al. page 2, paragraph 0023). It would have been obvious to use such bearings in the noted combination because such bearings reduce friction in the apparatus and a low  
15 variance in broad temperature ranges (See Jones et al. same paragraph).

Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiramatsu et al. in view of Chass, and  
20 further in view of Arms et al. (US 5,777,467). Regarding claim 13, the combination of Hiramatsu et al. in view of Chass teach the limitations of claims 1, 8 and 11 as noted above. However, they do not teach of the particular material for the core, while

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they do require the material to be non-magnetic. Arms et al. teaches using a super-elastic material, such as nickel-titanium alloys, for a core in a linear transducer (See Arms et al. col. 2, line 49 to col. 3, line 63). It would have been to a person  
5 having ordinary skill in the art to use the nickel-titanium alloy for the core in the sensor of Hiramatsu et al. in view of Chass. One would have been motivated to do so to allow for bending of the core in certain conditions without the core bending to accommodate for any misalignment (See Arms et al.  
10 col. 3, lines 48-52).

Regarding claim 14, nitinol is a nickel-titanium alloy, thus the noted combination teaches this claim.

Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as  
15 being unpatentable over Roeger as applied to claims 1 and 15 above, and further in view of Admission (page 6 of Specification, lines 8-9). Roeger teaches each and every limitation of claims 1 and 15 as noted above. However, this combination teaches of only a three coil design. Nonetheless,  
20 it would have been obvious to use a one or two coil design, because as admitted by Applicant, using one, two or three coils in such a device are well known in the art alternatives (See Specification page 6, lines 8-9).



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Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Roeger as applied to claims 1 and 21 above, and further in view of Davis et al. (US 4,347,492). Roeger does  
5 not explicitly disclose the type of magnetic material used in the core. Davis et al. teaches a core in a similar device being made of iron. It would have been obvious to use iron in as the magnetic material because iron and iron alloys (ferrite) are well known magnetic materials in the art (See Davis et al. and  
10 see also Ko et al. US 5,642,043).

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Roeger as applied to claims 1 and 23 above, and further in view of Sturdevant (US 5,414,940). Roeger does  
15 not explicitly disclose the hardened tip material. Sturdevant teaches using a ruby tip for in a contact position sensor (See FIG. 1, item 14). It would have been obvious to use the ruby tip of Sturdevant because as is well known in the art, ruby material is sufficiently hard enough that it will not wear after  
20 use.

Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over either Roeger or Inaba et al. Either Roeger

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or Inaba et al. teach the limitations of claim 28. However, neither explicitly teaches the dimensions of the device as recited in claim 33. Nonetheless, modifying either reference to have the relative dimensions as recited in the claims would be  
5 obvious to one having ordinary skill in the art through routine experimentation because where the where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently  
10 than the prior art device, the claimed device is not patentably distinct from the prior art device. See *Gardner v. TEC Systems, Inc.*, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 225 USPQ 232 (1984).

15 Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuboi (US 6,573,686) in view of ordinary skill in the art. Tsuboi teaches an array of displacement sensors providing displacement measurements. However, Tsuboi does not explicitly teach any specific spacing between sensors.  
20 Nonetheless, modifying Tsuboi to have the relative dimensions as recited in the claims would be obvious to one having ordinary skill in the art through routine experimentation because where the where the only difference between the prior art and the

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claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device is not patentably distinct from the prior art device. See  
5 *Gardner v. TEC Systems, Inc.*, 220 USPQ 777 (Fed. Cir. 1984),  
*cert. denied*, 225 USPQ 232 (1984).

### ***Conclusion***

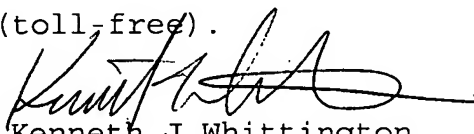
The prior art made of record and not relied upon is  
10 considered pertinent to applicant's disclosure. Schmitz et al.  
(US 6,469,500), Warshaw (US 2,417,097), Ward (US 4,406,99),  
Nekado (US 6,580,264), Golinelli (US 4,616,420) and Golinelli  
(US 6,760,980) each disclose varying designs of linear  
transducers based on induction or eddy currents.

15 Any inquiry concerning this communication or earlier  
communications from the examiner should be directed to Kenneth J  
Whittington whose telephone number is (571) 272-2264. The  
examiner can normally be reached on Monday-Friday, 7:30am-  
4:00pm.


20 If attempts to reach the examiner by telephone are  
unsuccessful, the examiner's supervisor, N. Le can be reached on  
(571) 272-2233. The fax phone number for the organization where  
this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Kenneth J Whittington  
Examiner  
Art Unit 2862

kjw

  
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